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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/853,318	05/10/2001	Takeshi Hoshida	064731.0184	5944

7590 01/24/2006

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EXAMINER	
LEUNG, CHRISTINA Y	
ART UNIT	**PAPER NUMBER**
2633	

DATE MAILED: 01/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/853,318	HOSHIDA, TAKESHI
	Examiner	Art Unit
	Christina Y. Leung	2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 11-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 11-20* is/are rejected.

7)☒ Claim(s) *4,12 and 17-19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10-13-05, 1-28-05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 28 January 2005 has been entered.

Allowable Subject Matter

2. The indicated allowability of claims 1-9 and 11-20 is withdrawn in view of the newly discovered references to Willner et al. ("1.2 Gb/s Closely-Spaced FDMA-FSK Direct-Detection Star Network," IEEE Photonics Technology Letters, vol. 2, no. 3, March 1990, pp. 223-226) and Chraplyvy et al. (US 5,027,435 A), in various combinations with other secondary references named below. Rejections based on the newly cited references follow.

Claim Objections

3. Claims 4, 12, and 17-19 are objected to because of the following informalities:

Examiner respectfully notes that claims 4, 12, and 17-19 each recite a "Mach-Zender interferometer," but the spelling of the term should be corrected to "Mach-Zehnder interferometer" in these claims so that they are consistent with other literature in the art.

Also, in claim 17, the phrase "a plurality of a data signals" in line 3 of the claim should be changed to "a plurality of data signals" for grammatical reasons.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 is indefinite because it currently depends on claim 10, which has been canceled. Examiner respectfully notes that claim 11 may depend on claim 9 instead,

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-5, 7, 17, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willner et al. ("1.2 Gb/s Closely-Spaced FDMA-FSK Direct-Detection Star Network," IEEE Photonics Technology Letters, vol. 2, no. 3, March 1990, pp. 223-226) in view of Doerr (US 6,088,144 A).

Regarding claims 1-5 and 7, Willner et al. disclose a method for processing information in a receiver of a multichannel optical communication system (see first paragraph under "II. Experiment" on page 223 in particular), comprising:

receiving a wavelength division multiplexed (WDM) signal having a symbol rate and comprising a plurality of non-intensity modulated optical information signals (specifically, they disclose frequency-shift-keying/FSK modulating two lasers),

demultiplexing the non-intensity modulated optical information signals from the WDM signal;

converting each of the non-intensity modulated optical information signals to an intensity modulated optical information signal using an interferometer; and

receiving a data signal from the intensity modulated optical information signal (specifically, they disclose using fiber Fabry-Perot filters, referred to as "FFP" in their disclosure, to demultiplex and demodulate the FSK signals into amplitude-shift-keying/ASK modulated signals; again, see first paragraph under "II. Experiment" on page 223).

Regarding claim 7 in particular, Willner et al. specifically disclose frequency-modulated optical information signals (i.e., FSK modulated signals).

Further regarding claims 1-3 in particular, Willner et al. further disclose that the carrier signals have a minimum channel spacing that is greater than (N+0.4)B and less than (N+0.6)B, and is substantially equal to (N+0.5) B, where B comprises the symbol rate of the WDM signal and N comprises an integer. Specifically, Willner et al. disclose that the channel separation is 33 GHz and that the symbol rate is 1.2 Gb/s (see second paragraph under "I. Introduction" and section "IV. Summary" in particular). Examiner notes that this channel spacing value is 27.5 times the symbol rate value (i.e., they disclose a value of the integer N which equals 27).

Further regarding claims 1-5 and 7, Willner et al. disclose an interferometric element comprising a Fabry-Perot filter/interferometer but do not specifically disclose an asymmetric

interferometer comprising an asymmetric Mach-Zehnder interferometer or an element comprising two interferometer paths having a path length difference operable to create a one symbol period shift in the optical information signal.

However, various types of interferometers are well known in the art, and Doerr in particular teaches a system (Figure 1) that is related to the one disclosed by Willner et al., including an interferometer 160 which converts a non-intensity modulated optical information signal to an intensity modulated optical information signal so that the data signal can be recovered (column 5, lines 8-59). Doerr further teaches that the interferometer may comprise either a Fabry-Perot filter like the one disclosed by Willner et al., or a Mach-Zehnder interferometer (column 7; lines 65-67; column 8, lines 1-17). Examiner respectfully notes that it is well understood in the art that a Mach-Zehnder interferometer, by definition, comprises two interferometer paths having a path length difference.

Regarding claims 1-5 and 7, it would have been obvious to a person of ordinary skill in the art to use a Mach-Zehnder interferometer as taught by Doerr instead of the Fabry-Perot interferometer in the method disclosed by Willner et al. as an engineering design choice of a way to demodulate the disclosed signals using widely available interferometric elements. The claimed differences exist not as a result of an attempt by Applicants to solve an unknown problem but merely amount to the selection of expedients known as design choices to one of ordinary skill in the art.

Regarding claims 17 and 20, Willner et al. disclose a method for communicating information in a wavelength division multiplexed (WDM) optical communication system (see first paragraph under "II. Experiment" on page 223 in particular), comprising:

transmitting each of a plurality of data signals using non-intensity modulation of a wavelength disparate carrier signal (specifically, they disclose frequency-shift-keying/FSK modulating two lasers),

converting the non-intensity modulation of the carrier signals into an intensity modulation using an interferometer (using fiber Fabry-Perot filters, referred to as "FFP" in their disclosure, which convert the FSK signals into amplitude-shift-keying/ASK modulated signals) ; and

receiving the data signal using a detector (i.e., "direct-detection receiver" mentioned in the first paragraph under "II. Experiment" on page 223) coupled to an output of the interferometer.

Further regarding claims 17 and 20, Willner et al. further disclose that the carrier signals have a minimum channel spacing that is greater than (N+0.4)B and less than (N+0.6)B, and is substantially equal to (N+0.5) B, where B comprises the symbol rate of the WDM signal and N comprises an integer. Specifically, Willner et al. disclose that the channel separation is 33 GHz and that the symbol rate is 1.2 Gb/s (see second paragraph under "I. Introduction" and section "IV. Summary" in particular). Examiner notes that this channel spacing value is 27.5 times the symbol rate value (i.e., they disclose a value of the integer N which equals 27).

Further regarding claims 17 and 20, Willner et al. disclose an interferometric element comprising a Fabry-Perot filter/interferometer but do not specifically disclose an asymmetric interferometer comprising an asymmetric Mach-Zehnder interferometer or an element comprising two interferometer paths having a path length difference operable to create a one symbol period shift in the optical information signal.

However, various types of interferometers are well known in the art, and Doerr in particular teaches a system (Figure 1) that is related to the one disclosed by Willner et al., including an interferometer 160 which converts a non-intensity modulated optical information signal to an intensity modulated optical information signal so that the data signal can be recovered (column 5, lines 8-59). Doerr further teaches that the interferometer may comprise either a Fabry-Perot filter like the one disclosed by Willner et al., or a Mach-Zehnder interferometer (column 7; lines 65-67; column 8, lines 1-17).

Regarding claims 17 and 20, it would have been obvious to a person of ordinary skill in the art to use a Mach-Zehnder interferometer as taught by Doerr instead of the Fabry-Perot interferometer in the method disclosed by Willner et al. as an engineering design choice of a way to demodulate the disclosed signals using widely available interferometric elements. The claimed differences exist not as a result of an attempt by Applicants to solve an unknown problem but merely amount to the selection of expedients known as design choices to one of ordinary skill in the art.

8. Claims 6, 8, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willner et al. in view of Doerr as applied to claims 1 or 17 above, and further in view of Ohshima (US 5,483,368 A).

Regarding claims 6 and 18-19, Willner et al. in view of Doerr describe methods as discussed above with regard to claims 1 and 17 respectively, including a detector (Willner et al., the first paragraph under "II. Experiment" on page 223) and an asymmetric Mach-Zehnder interferometer (Doerr, column 7; lines 65-67; column 8, lines 1-17). It is well understood in the art that a Mach-Zehnder interferometer, by definition, comprises two interferometer paths having

a path length difference. However, Willner et al. in view of Doerr do not specifically suggest that the Mach-Zehnder interferometer comprises complementary outputs or that the detector is a dual detector.

However, Ohshima teaches a related system including a Mach-Zehnder interferometer for converting non-intensity modulated signals into intensity-modulated signals for detection, and further teaches using a Mach-Zehnder interferometer with complementary outputs connected to a dual detector (Figure 7; column 7, lines 49-67; column 8, lines 1-9). Regarding claims 6, 18, and 19, it would have been obvious to a person of ordinary skill in the art to use the dual detector arrangement taught by Ohshima in the system described by Willner et al. in view of Doerr in order to effectively demodulate and detect the transmitted data.

Regarding claim 8, Willner et al. in view of Doerr describe a method as discussed above with regard to claim 1, but they do not specifically disclose or suggest a phase-modulated optical information signal. However, various forms of non-intensity modulation are well known in the art, and Ohshima also teaches that interferometers may be used to receive frequency-modulated or phase-modulated signals by converting either type of signal into intensity-modulated signals for detection (column 4, lines 36-43). It would have been obvious to a person of ordinary skill in the art to use phase modulation as taught by Ohshima instead of frequency modulated in the system described by Willner et al. in view of Doerr as an engineering design choice of an another already known modulation technique for transmitting optical signals which would also advantageously maintain relatively constant optical power in the signals (unlike intensity-modulated signals).

9. Claims 9, 11-13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chraplyvy et al. (US 5,027,435 A) in view of Doerr and Willner et al.

Regarding claims 9, 11-13, and 15 (as well as claim 11 may be understood with respect to 35 U.S.C. 112, discussed above), Chraplyvy et al. disclose an optical receiver for a wavelength division multiplex (WDM) optical communication system (Figures 6 and 9), comprising:

a demultiplexer (beam splitter 976, shown in Figure 9) operable to demultiplex a wavelength division multiplex (WDM) signal into a plurality of non-intensity modulated optical information signals,

an interferometer 978 operable to receive a corresponding one of the plurality of non-intensity modulated optical information signals;

the interferometer operable to convert the non-intensity modulated optical information signal into an intensity modulated optical information signal (column 11, lines 45-52; column 14, lines 42-48); and

a detector (such as receiver 982) operable to recover a data signal from the intensity-modulated optical information signal (column 14, lines 48-51).

Examiner respectfully notes that although element 976 is labeled "beam splitter" in Figure 9, Chraplyvy et al. specifically disclose that beam splitter 976 may be a frequency-selective coupler (i.e., a demultiplexer) which would demultiplex a wavelength division multiplex signal into wavelength components instead of simply directing the same completely multiplexed signal into multiple paths (column 14, lines 61-67).

Further regarding claims 9, 11-13, and 15, Chraplyvy et al. disclose an interferometric element comprising a Fabry-Perot filter/interferometer and do not specifically disclose an

asymmetric interferometer comprising an asymmetric Mach-Zehnder interferometer or an element comprising two interferometer paths having a path length difference operable to create a one symbol period shift in the optical information signal.

However, various types of interferometers are well known in the art, and Doerr in particular teach a system that is related to the one disclosed by Chraplyvy et al., including an interferometer which converts a non-intensity modulated optical information signal to an intensity modulated optical information signal so that the data signal can be recovered. Doerr further teach that the interferometer may comprise either a Fabry-Perot filter like the one disclosed by Chraplyvy et al., or a Mach-Zehnder interferometer (Examiner respectfully notes that it is well understood in the art that a Mach-Zehnder interferometer, by definition, comprises two interferometer paths having a path length difference).

Regarding claims 9, 11-13, and 15, it would have been obvious to a person of ordinary skill in the art to use a Mach-Zehnder interferometer as taught by Doerr instead of the Fabry-Perot interferometer in the method disclosed by Chraplyvy et al. as an engineering design choice of a way to demodulate the disclosed signals using widely available interferometric elements. The claimed differences exist not as a result of an attempt by Applicants to solve an unknown problem but merely amount to the selection of expedients known as design choices to one of ordinary skill in the art.

Further regarding claims 9, 11-13, and 15, Chraplyvy et al. disclose that the minimum channel spacing "can be as low as 6.4 B...where B is the bit rate" (column 15, lines 3-7). They also disclose, by way of an example, that when the bit rate is 45 Mb/s, the channel spacing may be a value in wide range of values (column 10, lines 41-46). Examiner respectfully notes that

Chraplyvy et al. therefore disclose that the channel spacing in their system may be any one of various values and that the channel spacing value may be related to the bit rate by a corresponding variety of multiples, including a multiple that falls within the claimed range (i.e., some integer N plus 0.5). For example, given the disclosed example bit rate of 45 Mb/s, Chraplyvy et al. inherently suggest that the channel spacing value may be 292.5 MHz (which corresponds to 6.5 times the bit rate), or 1.24 GHz (which corresponds to 27.5 times the bit rate), etc.

Furthermore, as similarly discussed above with regard to claims 1 and 17, Willner et al. teach a system that is related to the one disclosed by Chraplyvy et al. including a plurality of wavelength division multiplexed, non-intensity modulated optical information signals that are received and demodulated by an interferometer which converts the signals into intensity-modulated signals for detection (see first paragraph under "II. Experiment" on page 223). Willner et al. further teach that the channel spacing (33 GHz) is specifically 27.5 times the symbol rate (1.2 Gb/s; see second paragraph under "I. Introduction" on page 223).

Regarding claims 9, 11-13, and 15, it would have been obvious to a person of ordinary skill in the art to specifically provide a channel spacing that is between (N+0.4)B and (N+0.6)B as suggested by Willner et al. in the system described by Chraplyvy et al. in view of Doerr as an engineering design choice of a channel spacing value that effectively accommodates the number of channels being transmitted together. Again, Chraplyvy et al. already discloses that the channel spacing in their system may be any one of various values.

10. Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chraplyvy et al. in view of Doerr and Willner et al. as applied to claim 9 above, and further in view of Ohshima.

Regarding claims 14 and 16, Chraplyvy et al. in view of Doerr and Willner et al. describe a system as discussed above with regard to claim 9, including a detector 982 (Chraplyvy et al., Figure 9) and an asymmetric Mach-Zehnder interferometer (Doerr, column 7; lines 65-67; column 8, lines 1-17).

Regarding claim 14 in particular, they do not specifically suggest that the detector is a dual detector. However, Ohshima teaches a related system including a Mach-Zehnder interferometer for converting non-intensity modulated signals into intensity-modulated signals for detection, and further teaches using a Mach-Zehnder interferometer with complementary outputs connected to a dual detector (Figure 7; column 7, lines 49-67; column 8, lines 1-9). Regarding claim 14, it would have been obvious to a person of ordinary skill in the art to use the dual detector arrangement taught by Ohshima in the system described by Chraplyvy et al. in view of Doerr and Willner et al. in order to effectively demodulate and detect the transmitted data.

Regarding claim 16 in particular, Chraplyvy et al. in view of Doerr and Willner et al. do not specifically disclose or suggest a phase-modulated optical information signal. However, various forms of non-intensity modulation are well known in the art, and Ohshima also teaches that interferometers may be used to receive frequency-modulated or phase-modulated signals by converting either type of signal into intensity-modulated signals for detection (column 4, lines 36-43). It would have been obvious to a person of ordinary skill in the art to use phase

modulation as taught by Ohshima instead of frequency modulated in the system described by Chraplyvy et al. in view of Doerr and Willner et al. as an engineering design choice of an another already known modulation technique for transmitting optical signals which would also advantageously maintain relatively constant optical power in the signals (unlike intensity-modulated signals).

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023. The examiner can normally be reached on Monday to Friday, 6:30 to 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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